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Adapting Ad Creative Text To Match A User's Communication Style

Jakob Foerster

Matthew Sharifi

ADAPTING AD CREATIVE TEXT TO MATCH A USER'S COMMUNICATION STYLE

ABSTRACT

A system and method for adapting the content of an ad-based on a user's communication style is disclosed. The content adaptation may be performed on the user's device or on a central server. On-device personalization can work best for mobile devices which are used as a primary means of communication. The method includes the steps of A) building a representation of the user's communication style, B) when an advertisement is to be shown to the user, customizing the ad by rewriting it according to the user's communication style and C) serving the optimized advertisement to the user. Building a representation of a user's writing style may involve modelling using either statistics or a classifier e.g. a neural network. Prior to rendering, the user's device would rewrite each of the ads, either by replacing words with synonyms or completely paraphrasing the ad to better match the user's communication style.

BACKGROUND

Ad creatives for search and display ads typically consist of fixed text and/or images. This content is provided by advertisers upfront, and is always the same for all users that share the same language. Across a population of users that use a given language, the optimal wording of the creative may differ. For example, some users may respond better to terms like "discount" or "cheap", whereas other users may not appreciate such terms. Additionally, some users prefer a more polite form of communication where other users prefer shorter and more direct communications. Existing systems for serving ads do not take into account a user's communication preferences when serving or rendering the ad. This means that a given ad may be less effective for a portion of the target population. Ideally, the ad creative would

be adapted to match the given user's style of communication so that the user will respond better.

DESCRIPTION

A system and method for adapting the content of an ad based on a user's communication style is disclosed. The content adaptation may be performed on the user's device or on a central server. On-device personalization can work best for mobile devices which are used as a primary means of communication. The method as illustrated in FIG. 1 includes the steps of A) building a representation of the user's communication style, B) when an advertisement is to be shown to the user, customizing the ad by rewriting it according to the user's communication style and C) serving or displaying the advertisement to the user.

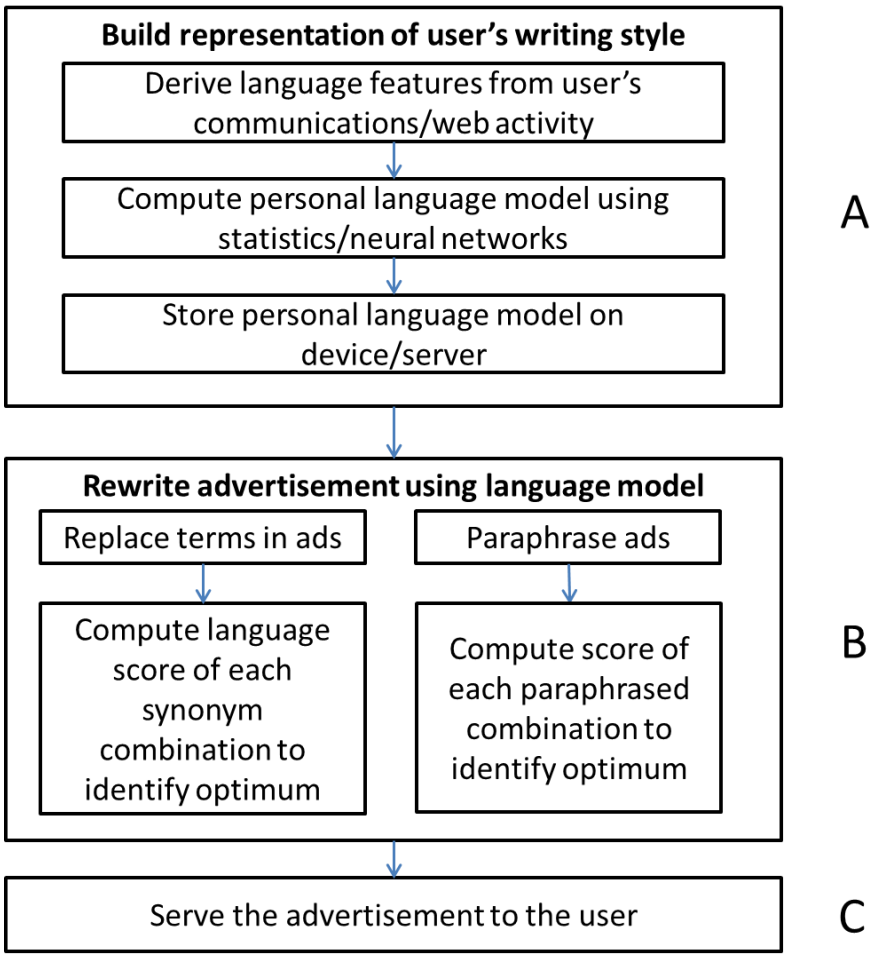

FIG. 1: Adapting ad creative text to match a user's communication style

Build a representation of the user's communication style – this is done using features derived from the user's communications as illustrated in step A of FIG. 1. These can be high level features such as sentiment, how direct is their communication etc. Such high-level features can be inferred using classifiers which analyze communication text, e.g. a neural network. Some features should also be more specific, e.g. which words does a user prefer. This may be captured via a personalized language model. The language model may be statistical or a neural network (e.g. LSTM). The language model would likely be the same as the user's keyboard language model but it may be separate and trained separately. As mentioned above, these features would generally be computed locally on the device for privacy reasons. In the case where server-based adaptation is used, the features can be computed over some other corpus of typed text, e.g. web searches. The computed representation of the user's communication style should be continually updated.

Rewrite advertisements - When a user performs a web search, the system uses existing techniques to rank and select which display ads are to be served, as illustrated in step B of FIG. 1. The top N ads in response to a query are served to a user's device. Prior to rendering, the user's device would rewrite each of the ads to better match the user's communication style. This rewriting may be performed by the client application or a browser. There are two forms of rewriting which can be applied: 1) term replacement and 2) paraphrasing. Term replacement allows replacing words with synonyms which the user would be more likely to use in their place. This can be done by computing a language model score for different versions of the ad text (either the full text or substrings). In each iteration, a word is replaced with each of its synonyms. If the LM score is higher than the original version, the word replacement is accepted. Word replacement is applied for all non-trivial words (e.g. stopwords can be skipped). This process is used to produce a version of the text that maximizes the user's language model score. Paraphrasing allows us to add, remove or

restructure the ad creative. Paraphrasing is applied based on higher-level features derived from a user's communications, e.g. how direct is the communication. Paraphrasing can be applied using standard NLP techniques, e.g. removing redundant words or summarizing the text. Alternatively it can be applied by running the neural network-based classifier over the ad creative and then making adjustments to the creative such that we best match the feature score from the user's communications. For example, if a user has a "verbosity" coefficient of 0.7, we can iteratively modify the ad creative such that it results in a similar coefficient. The optimized advertisement is then served to the user (Step C of FIG. 1).

In a variation of the method, along with adapting textual content, images could also be adapted to better suit a user's style preferences. As with text, this can be done on-device, either in conjunction with text adaptation or separately. This technique would generally be applied only to display ads where part or all of the ad creative is an image. The user's preferred style may be inferred through photos which they have taken. A neural network trained to detect style can be used to generate an embedding for each of the user's photos. This embedding captures the user's photographic style. At serving time, the ad system may provide multiple different images which are selected (generally on-device) based on which best matches the user's style preference (i.e. that which is closest to one of the user's style embeddings or an average embedding).

As disclosed herein, the method could be performed either on a user’s device or on a web-based server. Performing the adaptation on the device has privacy benefits and often allows for more accurate and more complete models of communications to be constructed. In situations in which the systems and methods discussed herein may collect personal information about users, or may make use of personal information (e.g., photos, and other user data), users are provided with one or more opportunities to control how information is collected about the user and used in one or more described features. A user is provided with

control over whether programs or features collect user data (e.g., recognition of a user's face in a photo or video, information about a user's social network, user characteristics (age, gender, profession, etc.), social actions or activities, a user's preferences, content created or submitted by a user, a user's current geographic location, etc.). A user is provided with control over whether programs or features collect user information about that particular user or other users relevant to the program or feature. Each user for which personal information is to be collected is presented with one or more options to allow control over the information collection relevant to that user, to provide permission or authorization as to whether the information is collected and as to which portions of the information are to be collected. For example, users can be provided with one or more control options over a communication network. In addition, certain data may be treated in one or more ways before it is stored or used, so that personally identifiable information is removed. For example, a user's identity may be treated so that no personally identifiable information can be determined for the user, or a user's geographic location may be generalized to a larger region so that a particular location of a user cannot be determined.